

REMARKS/ARGUMENTS

This Amendment is in response to the Final Office Action mailed May 31, 2007. Claims 1-24 were pending in the present application. This Amendment amends claims 1-3, 5, 8, 10-11, 15, and 18; and cancels claims 4 and 9; leaving pending in the application claims 1-3, 5-8, and 10-24. Reconsideration of the rejected claims is respectfully requested.

I. Rejection under 35 U.S.C. §103

Claims 1-24 are rejected under 35 U.S.C. §103(a) as being obvious over *Bridge* (US 6,530,035) in view of *Iwami* (US 2002/0112030) and *Ohran* (US 2002/0112134). Applicants respectfully submit that these references do not teach or suggest each element of these claims.

For example, Applicants' claim 1 as amended recites a method of controlling a storage system having primary storage volumes and replication storage volumes for improving reliability of the storage system, the method comprising:

determining a plurality of failure boundaries in the storage system, each failure boundary identifying a portion of the storage system that will be affected by a type of storage failure, one of the plurality of failure boundaries being determined using at least one of error correction group and controller group information of the primary storage volumes and replication storage volumes to divide the storage volumes into failure groups of logical volumes; and

using the plurality of determined failure boundaries and a type of content to be stored to assign replication storage volumes,
wherein a first type of content to be stored has replication storage volumes assigned across each failure boundary, such that at least some of the replication storage volumes are located outside the respective failure boundary for any of the types of storage failure, and
wherein a second type of content is able to be stored having replication storage volume within at least one failure boundary

(*emphasis added*). Such limitations are neither taught nor suggested by these references.

As discussed previously, *Bridge* teaches managing a storage system through use of failure groups, wherein each disk drive is paired with one or more mirrored disk drives from other failure groups, where mirror partners are formed "so that every disk drive has mirror partners in as many different failure groups as possible" (col. 2, lines 43-59; col. 4, lines 13-43). *Bridge* thus teaches storing all copied data in different failure groups, but does not teach or suggest determining a plurality of failure boundaries for different types of failure and assigning

replication storage volumes within and across failure boundaries based upon the type of data to be stored, such as full backup data being stored across failure boundaries and differential backup data being stored within a failure boundary as recited in claim 23. Further, as recognized in the Office Action on pages 3-4, *Bridge* does not teach or suggest a boundary being determined using error correction group and controller group information of the primary storage volumes and replication storage volumes to divide the storage volumes into failure groups of logical volumes as recited in Applicants' claim 1. *Bridge* thus cannot render obvious Applicants' claim 1 as amended.

Iwami does not make up for these deficiencies in *Bridge* with respect to Applicants' claim 1. *Iwami* teaches guaranteeing data access speed having guaranteed qualities of service, where the communication speed of data paths is assigned in order to accommodate the speed of storage system resources, such as storage disks connected by these data paths (paragraph [0006]). In one example, a logical disk and an associated communication path can have an assigned quality of service where the logical disk is created within an error checking and correcting group (paragraphs [0032], [0036]). *Iwami* does not, however, teach or suggest determining a plurality of failure boundaries for different types of failure, and assigning storage volumes within and across failure boundaries based upon the type of data to be stored, particularly where a first type of content to be stored has replication storage volumes assigned across each failure boundary, such that at least some of the replication storage volumes are located outside the respective failure boundary for any of the types of storage failure. As such, *Iwami* cannot render obvious Applicants' claim 1, or the claims that depend therefrom, either alone or in combination with *Bridge*.

Ohran does not make up for the deficiencies in either reference with respect to Applicants' claim 1. *Ohran* teaches mirroring data, and then storing blocks of the original data in preservation memory such that if certain data blocks are lost or corrupted, the blocks stored in preservation memory can be used to incrementally restore the data until the data is restored to a point that is most likely more recent than the original mirrored volume (paragraphs [0012]-[0015]). *Ohran* does not teach or suggest determining a plurality of failure volumes based on

types of failure and assigning replication volumes across or within the boundaries based on a type of content. Even if for sake of argument the preservation memory were improperly construed to be assigned across the failure boundary, there is no teaching of suggestion in *Ohran* to look at different types of failures and determine multiple failure boundaries. Further, there is no teaching or suggestion to assign replication volumes across multiple failure boundaries such that for each type of failure at least some of the replication volumes will be across the respective failure boundary. As such, *Ohran* cannot render obvious Applicants' claim 1 or the claims that depend therefrom, either alone or in any combination with *Bridge* and *Iwami*.

Further, there is no motivation in any of these references to combine the teachings contained therein. Even if the references were combined, however, the resulting combination would at best use multiple mirrors as in *Bridge*, with blocks of data stored separately for the mirrors in preservation memory as in *Ohran*, or reducing the number of necessary mirrors by utilizing the preservation memory. Such a combination would not, however, determine multiple failure boundaries based on types of failure and assign replication volumes across the boundaries such that for each type of failure at least some of the replication volumes fall outside the boundary. For at least these reasons, any combination of these references would not render obvious Applicants' claim 1 or the claims that depend therefrom. Applicants' claim 10 recites limitations that similarly are rendered obvious by *Iwami*, *Bridge*, and *Ohran*, individually or in combination, for reasons including those above. Applicants therefore respectfully request that the rejection with respect to claims 1-24 be withdrawn.

II. Amendment to the Claims

Unless otherwise specified or addressed in the remarks section, amendments to the claims are made for purposes of clarity, and are not intended to alter the scope of the claims or limit any equivalents thereof. The amendments are supported by the specification and do not add new matter.

Appl. No. 10/767,247
Amdt. dated September 28, 2007
Amendment under 37 CFR 1.116 Expedited Procedure
Examining Group 2185

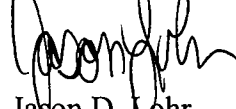
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CONCLUSION

In view of the foregoing, Applicants believe all claims now pending in this Application are in condition for allowance and an action to that end is respectfully requested.

If the Examiner believes a telephone conference would expedite prosecution of this application, please telephone the undersigned at 925-472-5000.

Respectfully submitted,



Jason D. Lohr
Reg. No. 48,163

TOWNSEND and TOWNSEND and CREW LLP
Two Embarcadero Center, Eighth Floor
San Francisco, California 94111-3834
Tel: 925-472-5000
Fax: 415-576-0300
Attachments
JDL:slh
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